

From the
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

To: PETER K. SOMMER
PHILLIPS, LYTTLE, HITCHCOCK, BLAINE, &
HUBER LLP
3400 HSBC CENTER
BUFFALO, NY 14203

PCT

NOTIFICATION OF TRANSMITTAL OF
INTERNATIONAL PRELIMINARY
EXAMINATION REPORT

(PCT Rule 71.1)

Date of Mailing
(day/month/year)

05 JUL 2001

Applicant's or agent's file reference
DUNLOP

IMPORTANT NOTIFICATION

International application No.

PCT/US99/08838

International filing date (day/month/year)

22 APRIL 1999

Priority Date (day/month/year)

NONE

Applicant

DUNLOP TIRE CORPORATION

1. The applicant is hereby notified that this International Preliminary Examining Authority transmits herewith the international preliminary examination report and its annexes, if any, established on the international application.
2. A copy of the report and its annexes, if any, is being transmitted to the International Bureau for communication to all the elected Offices.
3. Where required by any of the elected Offices, the International Bureau will prepare an English translation of the report (but not of any annexes) and will transmit such translation to those Offices.
4. **REMINDER**

The applicant must enter the national phase before each elected Office by performing certain acts (filing translations and paying national fees) within 30 months from the priority date (or later in some Offices)(Article 39(1))(see also the reminder sent by the International Bureau with Form PCT/IB/301).

Where a translation of the international application must be furnished to an elected Office, that translation must contain a translation of any annexes to the international preliminary examination report. It is the applicant's responsibility to prepare and furnish such translation directly to each elected Office concerned.

For further details on the applicable time limits and requirements of the elected Offices, see Volume II of the PCT Applicant's Guide.

Name and mailing address of the IPEA/US
Commissioner of Patents and Trademarks
Box PCT
Washington, D.C. 20231

Facsimile No. (703) 305-3230

Authorized officer

CALLIE SHOSHO

Telephone No. (703) 308-0651

(51) International Patent Classification ⁶ : C08K 3/04, 3/22, 3/30, C08L 9/00, 9/06, 25/10		(11) International Publication Number: WO 00/64968
(21) International Application Number: PCT/US99/08838		(43) International Publication Date: 2 November 2000 (02.11.00)
(22) International Filing Date: 22 April 1999 (22.04.99)		(81) Designated States: AU, BR, CA, CN, CZ, KR, MX, NO, NZ, PL, US, European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).
(71) Applicant (for all designated States except US): DUNLOP TIRE CORPORATION [US/US]; 200 John James Audubon Parkway, West Amherst, NY 14228 (US).		Published With international search report.
(72) Inventor; and (75) Inventor/Applicant (for US only): GATTI, Louis, F. [US/US]; 1942 Majorie Road, Grand Island, NY 14072 (US).		
(74) Agents: SOMMER, Peter, K. et al.; Phillips, Lytle, Hitchcock, Blaine & Huber LLP, 3400 HSBC Center, Buffalo, NY 14203 (US).		
(54) Title: VULCANIZABLE ELASTOMERIC COMPOSITIONS FOR USE AS TIRE TREADS		
(57) Abstract Vulcanizable elastomeric compounds having enhanced viscoelastic properties include 100 parts by weight of at least one diene-based elastomer, and from about 30 to about 160 phr of filler. The filler may contain zinc sulfate (with an average particle size of about 0.5–1.0 microns), barium sulfate (with an average particle size of about 1.0–2.0 microns) and/or titanium dioxide (with an average particle size of about 0.05–1.0 microns).		
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PATENT COOPERATION T. ATY

PCT

NOTIFICATION OF ELECTION

(PCT Rule 61.2)

From the INTERNATIONAL BUREAU

To:

Commissioner
US Department of Commerce
United States Patent and Trademark
Office, PCT
2011 South Clark Place Room
CP2/5C24
Arlington, VA 22202
ETATS-UNIS D'AMERIQUE
in its capacity as elected Office

Date of mailing (day/month/year) 12 February 2001 (12.02.01)	
International application No. PCT/US99/08838	Applicant's or agent's file reference DUNLOP
International filing date (day/month/year) 22 April 1999 (22.04.99)	Priority date (day/month/year)
Applicant GATTI, Louis, F.	

1. The designated Office is hereby notified of its election made:

☒ in the demand filed with the International Preliminary Examining Authority on:
03 November 2000 (03.11.00)

☐ in a notice effecting later election filed with the International Bureau on:

2. The election ☒ was
☐ was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No.: (41-22) 740.14.35	Authorized officer S. Mafla Telephone No.: (41-22) 338.83.38
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INTERNATIONAL SEARCH REPORT

International application No.

PCT/US99/08838

A. CLASSIFICATION OF SUBJECT MATTER

IPC(6) : C08K 3/04, 3/22, 3/30; C08L 9/00, 9/06, 25/10

US CL : 524/423, 495, 497, 575

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 524/423, 495, 497, 575

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

Please See Extra Sheet.

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 5,391,600 (UMEDA ET AL.) 21 February 1995, col.5, lines 54-63, col.6, lines 25-31, 35, 44, and 52, col.8, lines 57-61, col.9, lines 50-54, and col.10, lines 14-27 and 31-39.	1-6
Y	US 5,508,333 (SHIMIZU) 16 April 1996, col.16, lines 47-col.17, line 23, and col.17, line 28.	7, 9-13
Y	GB 2151538 (ITO ET AL.) 24 July 1985, page 2, lines 42-47.	8

☒ Further documents are listed in the continuation of Box C.
 ☐ See patent family annex.

* Special categories of cited documents:	*T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
A document defining the general state of the art which is not considered to be of particular relevance	*X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
E earlier document published on or after the international filing date	*Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
L document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	*Z* document member of the same patent family
O document referring to an oral disclosure, use, exhibition or other means	
P document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search

04 JUNE 1999

Date of mailing of the international search report

01 JUL 1999

 Name and mailing address of the ISA/US
 Commissioner of Patents and Trademarks
 Box PCT
 Washington, D.C. 20231

Facsimile No. (703) 305-3230

Authorized officer

CALLIE SHOSHO

Telephone No. (703) 305-0208

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US99/08838

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 5,063,268 (YOUNG) 05 November 1991, col.6, line 59, col.7, line 35, and col.7, line 67- col.8, line 1.	14, 16-19
Y	US 5,310,815 (SENYEK ET AL.) 10 May 1994, col.4, lines 37-40 and 62-65.	14, 16-19
Y	US 4,225,383 (MCREYNOLDS) 30 September 1980, col.5, lines 39-43.	15
A	US 4,788,231 (SMIGERSKI ET AL.) 29 November 1988	1
A	US 5,208,282 (REHMER ET AL.) 04 May 1993	1
A	US 4,122,062 (MONTE ET AL.) 24 October 1978	1
A	US 5,804,644 (NAKAFUTAMI ET AL.) 08 September 1998	1
A	US 4,409,359 (TANIMURA ET AL.) 11 October 1983	1
A	US 5,159,014 (TSUTSUMI ET AL.) 27 October 1992	1

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US99/08838

B. FIELDS SEARCHED

Electronic data bases consulted (Name of data base and where practicable terms used):

APS, STN/CAS

search terms: zinc sulfate, barium sulfate, titanium dioxide, silica, carbon black, styrene butadiene, tire tread, silane coupler, diene, elastomer

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

REC'D 10 JUL 2001

WIPO

PCT

Applicant's or agent's file reference DUNLOP	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/US99/08838	International filing date (day/month/year) 22 APRIL 1999	Priority date (day/month/year) NONE
International Patent Classification (IPC) or national classification and IPC Please See Supplemental Sheet.		
Applicant DUNLOP TIRE CORPORATION		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.


2. This REPORT consists of a total of 6 sheets.

☒ This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority. (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of 2 sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☐ Non-establishment of report with regard to novelty, inventive step or industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☐ Certain observations on the international application

Date of submission of the demand 03 NOVEMBER 2000	Date of completion of this report 21 MAY 2001
Name and mailing address of the IPEA/US Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231	Authorized officer CALLIE SHOSHO 
Facsimile No. (703) 305-3230	Telephone No. (703) 308-0651

I. Basis of the report

1. With regard to the elements of the international application:*

☐ the international application as originally filed☒ the description:

pages (See Attached) _____, as originally filed
pages _____, filed with the demand
pages _____, filed with the letter of _____

☒ the claims:

pages (See Attached) _____, as originally filed
pages _____, as amended (together with any statement) under Article 19
pages _____, filed with the demand
pages _____, filed with the letter of _____

☒ the drawings:

pages (See Attached) _____, as originally filed
pages _____, filed with the demand
pages _____, filed with the letter of _____

☒ the sequence listing part of the description:

pages (See Attached) _____, as originally filed
pages _____, filed with the demand
pages _____, filed with the letter of _____

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language _____ which is:

☐ the language of a translation furnished for the purposes of international search (under Rule 23.1(b)).☐ the language of publication of the international application (under Rule 48.3(b)).☐ the language of the translation furnished for the purposes of international preliminary examination (under Rules 55.2 and/or 55.3).3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:☐ contained in the international application in printed form.☐ filed together with the international application in computer readable form.☐ furnished subsequently to this Authority in written form.☐ furnished subsequently to this Authority in computer readable form.☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.4. ☒ The amendments have resulted in the cancellation of:☒ the description, pages NONE☒ the claims, Nos. 8, 11-13, 15, 18-19☒ the drawings, sheets/fig NONE5. ☐ This report has been drawn as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).**

* Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17).

**Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**1. statement**

Novelty (N)	Claims <u>1-7, 9-10, 14, 16-17</u>	YES
	Claims <u>NONE</u>	NO
Inventive Step (IS)	Claims <u>NONE</u>	YES
	Claims <u>1-7, 9-10, 14, 16-17</u>	NO
Industrial Applicability (IA)	Claims <u>1-7, 9-10, 14, 16-17</u>	YES
	Claims <u>NONE</u>	NO

2. citations and explanations (Rule 70.7)

1. Claims 1, 3, and 5-6 lack an inventive step under PCT Article 33(3) as being obvious over Smigerski et al. (U.S. 4,788,231).

Smigerski et al. disclose a tire tread comprising 100 parts diene based elastomer and filler comprising 40-250 phr carbon black and 0.1-6.5 phr zinc sulfate (col.2, lines 38-51, col.3, lines 26-56 and 61-62, and col.5, line 32).

Although the present claims require that the tire tread comprise at least 7 phr zinc sulfate and Smigerski et al. disclose 6.5 phr zinc sulfate, given that the instantly claimed amount of zinc sulfate and that disclosed by Smigerski et al. are so close to each other, it would have been obvious to one of ordinary skill in the art, absent evidence of criticality, that (i) the zinc sulfate disclosed by Smigerski et al. would have the same properties and similar functions as the zinc sulfate presently claimed and (ii) that the amount of zinc sulfate disclosed in the present claims is but an obvious variant of the amount disclosed by Smigerski et al., and thereby one of ordinary skill in the art would have arrived at the claimed invention.

With respect to applicant's amendments and arguments regarding claim 1, specifically, the amendment that the filler comprises "at least 7 phr zinc sulfate", it is noted that claims are given the broadest reasonable interpretation consistent with the specification. Looking to the specification, it is noted that there is no other disclosure in the specification except that the amount of zinc sulfate is present in an amount of "at least about 7 phr". Absent any other interpretation, it appears that based on the specification there is no difference between "at least about 7 phr" and "at least 7 phr". Thus, Smigerski et al. remains a relevant reference against the present claims.

Further, it is noted that it is not the examiner's position that one of ordinary skill in the art must modify Smigerski et al.'s amount of zinc sulfate, but rather that the amount of zinc sulfate disclosed by Smigerski et al., i.e. 6.5 phr, is so close to that presently claimed, it would have been obvious to one of ordinary skill in the art that, absent evidence to the contrary, zinc sulfate in an amount disclosed by Smigerski et al. would function the same in a tire tread as zinc sulfate in an amount as

(Continued on Supplemental Sheet.)

Supplemental B x

(To be used when the space in any of the preceding boxes is not sufficient)

Continuation of: Boxes I - VIII

Sheet 10

CLASSIFICATION:

The International Patent Classification (IPC) and/or the National classification are as listed below:

IPC(7): C08K 3/04, 3/22, 3/30; C08L 9/00, 9/06, 25/10 and US Cl.: 152/209.1; 524/423, 495, 497, 575

I. BASIS OF REPORT:

This report has been drawn on the basis of the description,
page(s) 1-8, as originally filed.
page(s) NONE, filed with the demand.
and additional amendments:
NONE

This report has been drawn on the basis of the claims,
page(s) NONE, as originally filed.
page(s) NONE, as amended under Article 19.
page(s) NONE, filed with the demand.
and additional amendments:
Pages 9 and 10, file with the letter of 05 May 2001.

This report has been drawn on the basis of the drawings,
page(s) NONE, as originally filed.
page(s) NONE, filed with the demand.
and additional amendments:
NONE

This report has been drawn on the basis of the sequence listing part of the description:
page(s) NONE, as originally filed.
pages(s) NONE, filed with the demand.
and additional amendments:
NONE

V. 2. REASONED STATEMENTS - CITATIONS AND EXPLANATIONS (Continued):

presently claimed and that the amount of zinc sulfate presently claimed is but an obvious variant of that disclosed by Smigerski et al.

2. Claim 4 lacks an inventive step under PCT Article 33(3) as being obvious over the prior art as applied in the immediately preceding paragraph and further in view of Shimizu (U.S. 5,508,333).

The difference between Smigerski et al. and the present claimed invention is the requirement in the claim of silica.

Shimizu, which is drawn to tire tread composition, disclose the use of silica filler in order to improve fracture properties, wet grip, and rolling resistance of the tire tread (col.6, lines 56-59).

In light of the motivation for using silica disclosed by Shimizu as described above, it would therefore have been obvious to one of ordinary skill in the art to use silica in the tire tread of Smigerski et al. in order to improve fracture properties, wet grip, and rolling resistance of the tire tread, and thereby arrive at the claimed invention.

3. Claims 1-6 lack an inventive step under PCT Article 33(3) as being obvious over Shimizu (U.S. 5,508,333) in view of Smigerski et al. (U.S. 4,883,829) and Umeda et al. (U.S. 5,391,600).

Shimizu discloses a tire tread comprising 100 parts diene based elastomer and 10-100 parts filler wherein the filler comprises 0.1-90 phr carbon black and 9.9-99.9 phr white filler such as barium sulfate or mixtures of barium sulfate and silica (col. 16, line 41-col.17, line 23 and col.17, line 28).

The difference between Shimizu and the present claimed invention is the requirement in the claims of (a) zinc sulfate and (b) particle size of zinc sulfate.

With respect to difference (a), Smigerski et al., which is drawn to tire treads, disclose the equivalence and interchangeability of zinc sulfate with barium sulfate wherein these metal salts are used to prevent particle segregation during

Supplemental Box

(To be used when the space in any of the preceding boxes is not sufficient)

Continuation of: Boxes I - VIII

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processing (col.1, lines 47-62, col.2, lines 20-23, and col.3, line 37).

In light of the disclosure of Smigerski et al., it would therefore have been obvious to one of ordinary skill in the art to use zinc sulfate as the filler in the tire tread of Shimizu in order to ensure effective processing, and thereby arrive at the claimed invention.

With respect to difference (b), Umeda et al., which is drawn to resin composition, disclose the use of zinc sulfate having particle size less than 1 micron. The motivation for using zinc sulfate with such particle size is that it has superior smoothness of surface (col.5, lines 25-31).

In light of the motivation for using zinc sulfate with particular particle size disclosed by Umeda et al. as described above, it would therefore have been obvious to one of ordinary skill in the art to use such zinc sulfate in the tire tread of Shimizu, and thereby arrive at the claimed invention.

With respect to applicant's arguments regarding Shimizu, it is noted that regardless of what Shimizu calls the filler, i.e. white carbon, the fact remains that among the white carbon fillers disclosed by Shimizu is barium sulfate (col.16, line 55). Further, col.6, lines 60-61 of Shimizu disclose that the tire tread comprises 10-100 phr filler, col.17, lines 7-8 disclose that the filler comprises carbon black and white carbon, and col.17, lines 18-21 disclose that the 10-100 phr filler comprises 0. 1-90 phr carbon black and 9.9-99.9 phr white carbon which includes barium sulfate.

Further, it is the examiner's position that given the disclosure of Smigerski et al. of the equivalence and interchangeability of zinc sulfate with barium sulfate, i.e. one of ordinary skill of the art would expect zinc sulfate to function the same as barium sulfate, given that Smigerski et al. and Shimizu are both drawn to tire treads, and absent evidence to the contrary, it would have been obvious to one of ordinary skill of the art to use zinc sulfate in place of barium sulfate as the filler in Shimizu, and thereby arrive at the claimed invention.

Additionally, while Umeda et al. is drawn to a polycarbonate resin composition, it is noted that the composition also contains diene-based elastomer as presently claimed (col.5, lines 19-32 and 54-55).

4. Claims 7 and 9-10 lack an inventive step under PCT Article 33(3) as being obvious over Shimizu (U.S. 5,508,333) in view of Craven (U.S. 3,878,147).

Shimizu discloses a tire tread comprising 100 parts diene based elastomer and 10-100 parts filler wherein the filler comprises 0.1-90 phr carbon black and 9.9-99.9 phr white filler such as barium sulfate or mixtures of barium sulfate and silica. There is also disclosed a silane coupling agent to reinforce the white pigment (col. 16, line 41-col.17, line 23 and col.17, line 28).

The difference between Shimizu and the present claimed invention is the requirement in the claims of the particle size of barium sulfate.

Craven, which is drawn to tire tread treads, disclose the use of particles such as barium sulfate having particle size of 0.2-105 microns in order to provide the necessary level of friction to the tire (col.2, lines 8, 13, and 16-18).

In light of the motivation for using barium sulfate with particular particle size disclosed by Craven as described above, it would therefore have been obvious to one of ordinary skill in the art to use such barium sulfate in the tire tread of Shimizu in order to control the level of friction, and thereby arrive at the claimed invention.

With respect to applicant's arguments regarding Shimizu, it is noted that regardless of what Shimizu calls the filler, i.e. white carbon, the fact remains that among the white carbon fillers disclosed by Shimizu is barium sulfate (col.16, line 55). Further, col.6, lines 60-61 of Shimizu disclose that the tire tread comprises 10-100 phr filler, col.17, lines 7-8 disclose that the filler comprises carbon black and white carbon, and col.17, lines 18-21 disclose that the 10-100 phr filler comprises 0. 1-90 phr carbon black and 9.9-99.9 phr white carbon which includes barium sulfate.

With respect to applicant's arguments that Shimizu discloses many different types of fillers and does not specifically teach the amount of barium sulfate as presently claimed, it is noted that given that Shimizu discloses the use of barium sulfate in an amount of 9.9-99.9 phr which clearly overlaps the amount presently claimed, i.e. "at least about 7 phr", and absent evidence of criticality regarding the type of filler utilized, it would have been obvious to one of ordinary skill in the art to choose barium sulfate as the filler as Shimizu, and thereby arrive at the claimed invention.

Additionally, although the motivation for using barium sulfate with specific particle size disclosed by Craven is different than that of the present invention, it is noted that obviousness is not negated because the motivation to arrive at the claimed invention is not the same motivation as applicants. Further, given that Craven discloses barium sulfate with particle size that overlaps that presently claimed, it would have been natural for one of ordinary skill in the art to infer that the barium sulfate would intrinsically modify the viscoelastic properties of Shimizu's elastomer.

5. Claims 14 and 16-17 lack an inventive step under PCT Article 33(3) as being obvious over Young (U.S. 5,063,268) in view of Kuan (U.S. 4,237,173).

Young discloses a tire tread comprising 25-40% diene based elastomer, 20-50% carbon black, and 3-15% titanium dioxide and silica (col.6, line 59, col.7, line 35, and col.7, line 67-col.8, line 1). It is calculated from present claim 14 that

Supplemental Box

(To be used when the space in any of the preceding boxes is not sufficient)

Continuation of: Boxes I - VIII

Sheet 12

the presently claimed tire tread comprises 39-77% diene based elastomer (100/260-100/130) and 23-61% filler. Thus, the amounts disclosed by Young clearly overlap those presently claimed.

The difference between Young and the present claimed invention is the requirement in the claims of the particle size of titanium dioxide.

Kuan, which is drawn to tire composition, disclose that controlling the particle size of titanium dioxide to 0.1-0.5 microns ensures high brightness, high tinting strength, and ease of dispersion (col.1, lines 44-47 and col.2, lines 1-5).

In light of the motivation for using titanium dioxide with particular particle size disclosed by Kuan as described above, it would therefore have been obvious to one of ordinary skill in the art to use such titanium dioxide in the tire tread of Young in order to ensure high brightness, high tinting strength, and ease of dispersion of the pigment, and thereby arrive at the claimed invention.

With respect to applicant's argument that Kuan is drawn to tire sidewall while present claims are drawn to tire tread, it is noted that Kuan is used only to teach the conventional particle size of titanium dioxide. Further, it is noted that "high brightness" is only one motivation disclosed by Kuan for controlling the particle size of titanium dioxide. Kuan also discloses that controlled particle size of titanium dioxide results in ease of dispersion which is important in tire tread composition given that the dispersion of filler in elastomer affects the physical and mechanical properties of the tread. Thus, Kuan remains a relevant reference against the present claims given that it discloses that controlling the particle size of titanium dioxide results in ease of dispersion which is a function especially relevant to the invention at hand.

6. Claims 14 and 16-17 lack an inventive step under PCT Article 33(3) as being obvious over Senyek et al. (U.S. 5,310,815) in view of Kuan (U.S. 4,237,173).

Senyek et al. disclose a tire tread comprising 100 parts diene based elastomer and 25-125 phr filler comprising titanium dioxide, carbon black, and silica (col.4, lines 37-40 and 62-65).

The difference between Senyek et al. and the present claims is the requirement in the claims of (a) specific amount of titanium dioxide and (b) particle size of titanium dioxide.

With respect to difference (a), although there is no explicit disclosure of the amount of titanium dioxide present, it would have been obvious to, as well as within the skill level of, one of ordinary skill in the art to choose amounts of titanium dioxide, including those presently claimed, in order to produce a tire tread with the desired amount of abrasion resistance and tensile strength, and thereby arrive at the claimed invention.

With respect to difference (b), Kuan, which is drawn to tire composition, disclose that controlling the particle size of titanium dioxide to 0.1-0.5 microns ensures high brightness, high tinting strength, and ease of dispersion (col.1, lines 44-47 and col.2, lines 1-5).

In light of the motivation for using titanium dioxide with particular particle size disclosed by Kuan as described above, it would therefore have been obvious to one of ordinary skill in the art to use such titanium dioxide in the tire tread of Senyek et al. in order to ensure high brightness, high tinting strength, and ease of dispersion of the pigment, and thereby arrive at the claimed invention.

With respect to applicant's argument that Kuan is drawn to tire sidewall while present claims are drawn to tire tread, it is noted that Kuan is used only to teach the conventional particle size of titanium dioxide. Further, it is noted that "high brightness" is only one motivation disclosed by Kuan for controlling the particle size of titanium dioxide. Kuan also discloses that controlled particle size of titanium dioxide results in ease of dispersion which is important in tire tread composition given that the dispersion of filler in elastomer affects the physical and mechanical properties of the tread. Thus, Kuan remains a relevant reference against the present claims given that it discloses that controlling the particle size of titanium dioxide results in ease of dispersion which is a function especially relevant to the invention at hand.

7. Claims 1-7, 9-10, 14, and 16-17 meet the criteria set out in PCT Article 33 (4) because the present invention has industrially applicability as a tire tread on tires used on automobiles.

----- NEW CITATIONS -----

US 4,237,173 A (KUAN) 02 December 1980 (02/12/80), col.1, lines 44-47 and col.2, lines 1-5.

US 3,878,147 A (CRAVEN) 15 April 1975 (15/04/75), col.2, lines 8, 13, and 10-18.

US 4,883,829 A (SMIGERSKI et al.) 28 November 1989 (28/11/89), col.1, lines 47-62, col.2, lines 20-23, and col.3, line 37.

US 4,788,231 A (SMIGERSKI et al.) 29 November 1988 (29/11/88), col.2, lines 38-54, col.3, lines 26-56 and 61-62, and col.5, line 32.